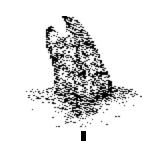


Observing Pacific Gray Whales

On-Site Activities

How Can Teachers, Chaperones, and Students Make the Most of Their Field Trip?	.109
Exhibit Panels at Point Reyes Lighthouse Visitor Center for Scavenger Hunt	.139
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How Can Teachers, Chaperones, and Students Make the Most of Their Field Trip?



)n-site

Students will visit the Point Reyes Lighthouse to view the gray whale's migration past the Headlands. Their field journals will focus their observations on the migration and the Scavenger Hunt sheets will allow students to learn more about the gray whales natural history and ecology.

Time required: 3 hours and travel time

Location: Point Reyes National Seashore, Point Reyes, Lighthouse

Visitor Center, Observation Deck

Suggested group size: consult with Education Coordinator when

making reservations

Subject(s): science, writing

Concept(s) covered: recording observations, mapping

migrations

Written by: Christie Denzel Anastasia, National Park Service

Last updated: 09/23/01

Student Outcomes

At the end of this activity, the students will be able to:

• Observe the Pacific gray whale migration and note observations in their field journals.

California Science Standards Links (grades 6-8)

This activity is linked to the California Science Standards in the following areas:

6th grade 5a- food webs

5b- organisms and the physical environment.

5e- the number and types of organisms an ecosystem can support depends on the resources available and abiotic factors, such as quantity of light and water, range of

temperatures, and soil composition

7b- appropriate tools and technology to perform tests, collect

and display data







7c-Construct appropriate graphs from data and develop qualitative

statements about the relationship between variables

7f- interpret a simple scale map

7h- identify changes in natural phenomena over time

7th grade 7a- appropriate tolls and technology to perform tests, collect and

display data.

National Science Standard Links (grades 5-8)

This activity is linked to the National Science Standards in the following areas:

- Content Standard A- Use appropriate tools and techniques to gather, analyze, and interpret data; understanding about scientific inquiry.
- Content Standard G- Science as human endeavor; Nature of Science: students formulate and test their explanations of nature using observation, experiments, and theoretical and mathematical models.
- Content Standard F- Populations, resources, and environments

Procedures

1. Travel to Bear Valley Visitor Center.

You may want to make the Bear Valley Visitor Center in Olema your first stop. Here you can pick up the Gray Whale Kit (binoculars, etc) and students may use the restrooms. There is also a slide show available upon request or students may look at the displays relating to the entire Seashore.

2. Travel to Point Reyes Lighthouse Visitor Center Parking Lot

Travel time from the Bear Valley Visitor Center to the Point Reyes Lighthouse Visitor Center Parking Lot is approximately 40- minutes.

3. Walk to Point Reyes Lighthouse Visitor Center and Observation Deck.

Once the bus arrives at the Parking Lot, there is a 15-minute walk to the Visitor Center and Observation Deck. Students or parents with accessibility issues may drive past the gate in a passenger vehicle to a designated parking area.

4. Split groups into teams.

The Observation Deck is located directly behind the Lighthouse Visitor Center. You may want to assign smaller groups to each chaperone. Half of the chaperone groups could go to the Observation Deck for whale watching while the other half—could go to the Lighthouse Visitor Center to work on Scavenger Hunt sheets. Some of the Scavenger Hunt sheets use the displays located on the Observation Deck. After a predetermined amount of time, groups will switch locations and activities.



5. Travel back to parking lot and school

Allow 15 minutes to walk back to the parking lot, and at least 40- minutes to return to Olema.

Extension ideas

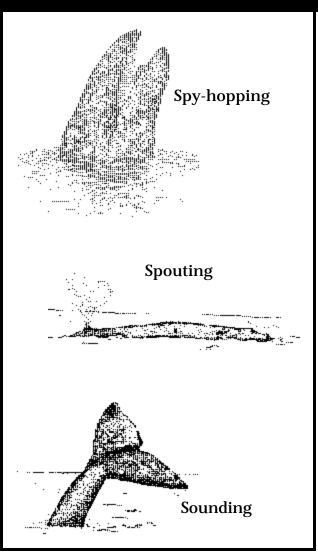
1.On the paved road, 250 yards before you get to the Lighthouse Visitor Center, you will walk on a life-sized painting of a gray whale. This mural provides a great opportunity for your students to understand the dimensions of a gray whale. If you "built" a whale in the classroom as a pre-visit activity, you could do a quick review on this painted whale, to reinforce what you did in the classroom. You could also quiz your students on the body parts of the whale by asking them to stand on a specific part as you call out its name (rostrum, fluke, blowhole, baleen, barnacles, etc.)

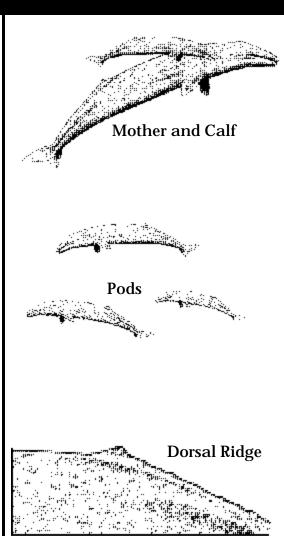


Things to	Remember While on Pacific Gray Whale Field Trip
ee safety precaution	ns:
1.	
2.	
3.	
_	
r resource protection	ı behaviors:
1.	
2.	
∠.	
3.	
رونو آنزو العبار العبار العبا	III III III III III III III III III II
4.	
-	
ree things to keep in	n mind when visiting any part of the National Park System:
1.	
2.	
~ •	
<u> </u>	
3.	<u> </u>

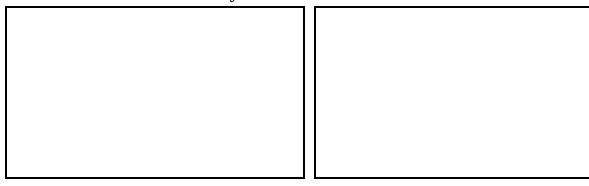
Gray Whale Field Guide

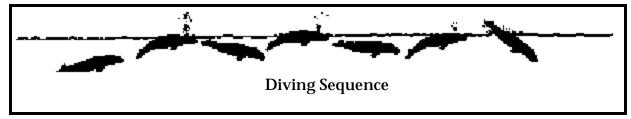






Behaviors observed, not listed above. Use the space below to sketch and record your observations.







Whal	~ C:~	htina	I
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Location:

Weather:

Cloud cover: clear - slightly cloudy - overcast - very cloudy - foggy

Sea conditions: smooth - small waves - choppy - stormy

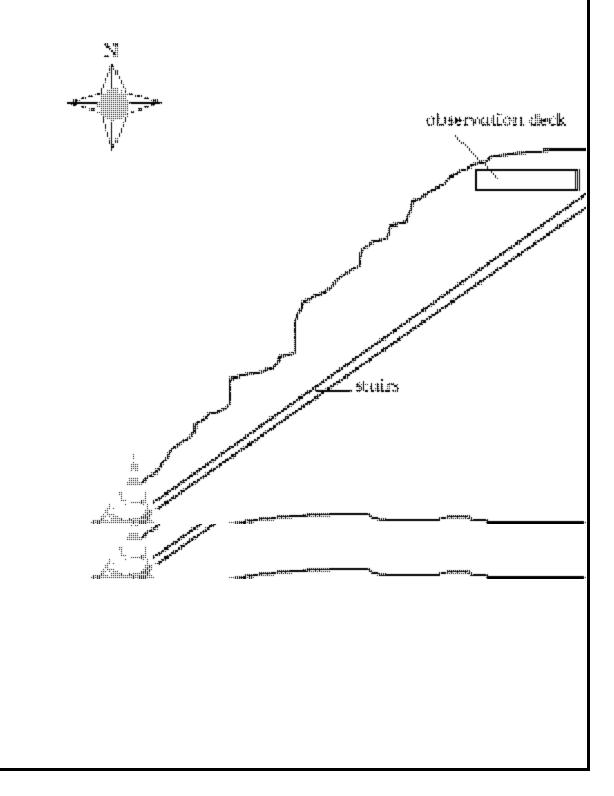
Identification Number	Time	Behavior	Notes (* don't forget to record location on Whale Sighting Map, next page)

Other Marine Species Sightings				
What were they doing?	How many did you see?			
	What were they			

Whale Sighting Map



Use the identification number from your Whale Sighting Log to mark the location and direction of your whales in relation to the Lighthouse.



A. Scavenger Hunt What's Out There?



Gray whales are protected by federal law. Their Baja breeding grounds are protected as a sanctuary in Mexico. But only small sections of their 10,000-mile migration route are protected.

List three elements of a gray whale's habitat that are necessary for its survival.

1.
no excessive noise
clean water
safe from oil spills
safe from net entanglement
no huniing

2.

3.

If you could write a law to insure a healthy migration for gray whales, what would be the title of this law?

"Large Gill Nets Banned During Peak of Whale Migration"

What is the closest area to Point Reyes National Seashore that protects a portion of the gray whales ocean habitat? Why is this additional protection important?

Gulf of the Farallones





B. Scavenger Hunt **Upwelling...the Foundation**

What could happen to the marine food chain if wind directions and ocean currents changed the spring weather patterns? What could happen to gray whales as a result?

could affect gray whale food source in arctic seas migration patterns could shift reproduction rates may fall or rise above average

Bonus: Is there a name given to these seasonal changes in wind direction and ocean currents?

El Niño La Niña

C. Scavenger Hunt Whales: Their Life Around Us



List two reasons why the waters offshore Point Reyes attract marine mammals.

1.

2.

abundant food source shallow continental shelf

What three other types of whales may be seen here?

1.

2.

3.

blue whale humpback whale minke whale





D. Scavenger Hunt **Gray Whale Facts**

Gray Whale Facts Why do you think gray whales have evolved to filter-feed on tiny invertebrates and amphipods along the ocean floor?

> less competition only baleen whale with this feeding strategy no choice high protein source for migrations low energy expenditure for large amount of food

Can you think of a land mammal or other organism with a similar feeding strategy?

hippopotamus, roseate spoonbill (bird)

E. Scavenger Hunt

Whale Watching...

List one reason why you think gray whales are performing each of the following behaviors:

Breaching

getting rid of lice, entertainment, aid to digestion, signalling to other whales (communication)

Spy-hopping

navigation, swallowing food, triangulation, lack of stereoscopic vision

Diving

searching for food, napping, navigation Traveling in pods safety, companionship, mating

Spouting

exhaling

Diving sequence of several short dives followed by a long dive

createing oxygen-rich blood supply before diving





F. Scavenger Hunt Whale Watching...Diving

How many times a year do gray whales pass by Point Reyes?

twice a year, once on their winter migration south and once on their spring migration north

Why is the Point Reyes Lighthouse such a good place to spot gray whales?

high ground where you can look over and out to sea, the Point Reyes Headlands also stick out into the ocean about 10 miles

What is a "spouting"?

air exhaled through blowholes that rises 10-15 feet and condenses into white vapor

What is a gray whale's "swimming pattern"?

a series of short dives with spouting followed by a deeper dive lasting several minutes



G. Scavenger Hunt **Gray Whale Migration**

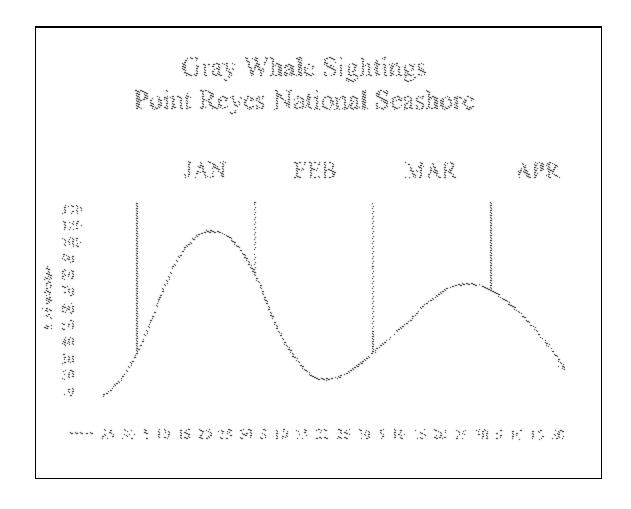


Based on this chart, how many gray whales might you expect to see over the full day of your visit?

answers will vary

What things could happen that would change how many whales you might see?

answers will vary







H. Scavenger Hunt Whale Baleen

Look closely at baleen on "Please Touch" display.

Can you guess which part of your body is most closely similar to baleen?

fingernails or hair

How are the two similar?

both have a ridge-like texture, pliable frayed edges

How are they different?

colors, size, uses are different

Bonus: Are horns or antlers more similar to baleen? Why?

horns are more similar to baleen antlers are more similar to bone

I. Scavenger Hunt **Photo Album**

Turn to the back of the photo album to see a shark feeding on a dead gray whale. Draw arrows connecting the ideas below in a logical sequence.

Shark excretes nitrogen-rich food waste 1 and 10 Upwelling

Gray whale feeds on zooplankton living in ocean and mud

Gray whale carcass floats on top of ocean

Nutrients provided to plant life and phytoplankton in ocean

5 Gray whale dies

7 Shark feeds on whale

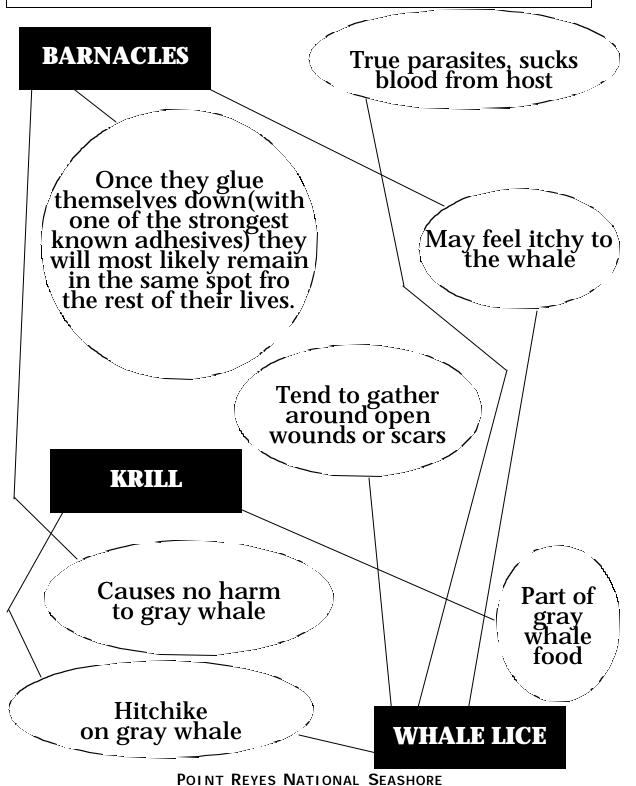
Amphipods feed on marine plants

Food waste settles on ocean floor



J. Scavenger Hunt **Barnacles, Krill, and Whale Lice**

Look closely at the krill, barnacles, and whale lice found inside clear jars. Draw a line matching each organism to a descriptivbe characteristic. Some characteristics apply to more than one organism.



A. Scavenger Hunt What's Out There?



Gray whales are protected by federal law. Their Baja breeding grounds are protected as a sanctuary in Mexico. But only small sections of their 10,000-mile migration route are protected.

List three elements of a gray whale's habitat that are necessary for its survival.

1.

2.

3.

If you could write a law to insure a healthy migration for gray whales, what would be the title of this law?

What is the closest area to Point Reyes National Seashore that protects a portion of the gray whale's ocean habitat? Why is this additional protection important?



B. Scavenger Hunt **Upwelling...the Foundation**

What could happen to the marine food chain if wind directions and ocean currents changed the spring weather patterns? What could happen to gray whales as a result?

Bonus: Is there a name given to these seasonal changes in wind direction and ocean current

C. Scavenger Hunt **Whales: Their Life Around Us**



List two reasons why the waters offshore Point Reyes attract marine mammals.

1.

2.



What three other types of whales may be seen here?

1.

2.

3.



D. Scavenger Hunt **Gray Whale Facts**

Gray Whale Facts Why do you think gray whales have evolved to filter-feed on tiny invertebrates and amphipods along the ocean floor?

Can you think of a land mammal or other organism with a similar feeding strategy?

E. Scavenger Hunt Whale Watching...



List one reason why you think gray whales are performing each of the following behaviors:

Breaching

Spy-hopping

Diving

Spouting

Diving sequence of several short dives followed by a long dive



F. Scavenger Hunt Whale Watching...Diving

How many times a year do gray whales pass by Point Reyes?

Why is the Point Reyes Lighthouse such a good place to spot gray whales?

What is a "spouting"?

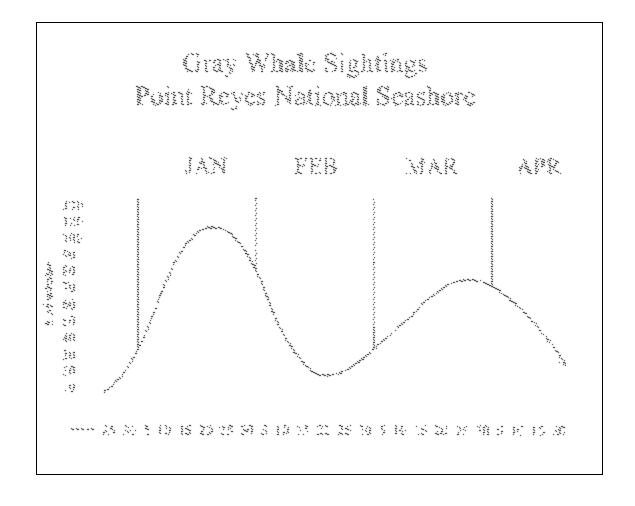
What is a gray whale's "swimming pattern"?

G. Scavenger Hunt **Gray Whale Migration**



Based on this chart, how many gray whales might you expect to see over the full day of your visit?

What things could happen that would change how many whales you might see?





H. Scavenger Hunt Whale Baleen

Look closely at baleen on "Please Touch" display.

Can you guess which part of your body is most closely similar to baleen?

How are the two similar?

How are they different?

Bonus: Are horns or antlers more similar to baleen? Why?

I. Scavenger Hunt **Photo Album**

Turn to the back of the photo album to see a shark feeding on a dead gray whale. Draw arrows connecting the ideas below in a logical sequence.

Shark excretes nitrogen-rich food waste **Upwelling**

Gray whale feeds on zooplankton living in ocean and mud

Gray whale carcass floats on top of ocean

Nutrients provided to plant life and phytoplankton in ocean

Gray whale dies

Shark feeds on whale

Amphipods feed on marine plants

Food waste settles on ocean floor



J. Scavenger Hunt **Barnacles, Krill, and Whale Lice**

Look closely at the krill, barnacles, and whale lice found inside clear jars. Draw a line matching each organism to a descriptivbe characteristic. Some characteristics apply to more than one organism.

BARNACLES

True parasites, sucks blood from host

Once they glue themselves down(with one of the strongest known adhesives) they will most likely remain in the same spot fro the rest of their lives.

May feel itchy to the whale

Tend to gather around open wounds or scars

KRILL

Causes no harm to gray whale

Hitchike on gray whale

Part of gray whale food

WHALE LICE



Exhibit Panels at Point Reyes Lighthouse Visitor Center for Scavenger Hunt



Α.

What's out there?

Location: first panel to left of entrance inside Visitor Center

The ocean waters offshore of Point Reyes host a multitude of marine life rivaling the richest areas on earth. On a clear day, one can view the Farallon Islands approximately 20 miles south of the Headlands. These islands host close to 30,000 breeding seabirds and 7,000 seals and sea lions every year. In the spring, dense colonies of cormorants, auklets, common murres, and western gulls nest on the rocky slopes and in underground burrows. Elephant seals and sea lions crowd the pocket beaches and marine terraces in fall and winter.

Gulf of the Farallones National Marine Sanctuary

Marine life flourishes in such abundance in the region that the area was designated the Gulf of the Farallones National Marine Sanctuary in 1981. The Sanctuary protects the vast resources of these waters-seabirds, leaping dolphins, giant whales, floating microscopic life, and the medium that makes the world possible-water.

В.

Upwelling: the Foundation of Ocean Life

Location, second panel to left of entrance inside Visitor Center

Spring is the ocean's most productive season just as it is on land. Northwesterly winds and southerly ocean currents combine with the earth's rotation to move warm surface water offshore, drawing nutrient rich cold water from the depths below. With sunlight for energy, microscopic plants feed other forms of life, contributing to a complex food chain. Upwelling is the foundation of the rich and resilient marine food web that exists in this ocean environment.

The Intertidal Zone: A ribbon of life

Along the ocean's edge lies a ribbon of diverse marine life belonging to both the land and sea. The intertidal organisms must adapt to survive pounding waves, constantly changing temperatures and salinity, dehydrating air and sun, and fresh water run-off from the land in winter.

Drawing of upwelling showing how surface water moves offshore, and upwelling of nutrient-rich water occurs.



C.

Whales: Their Life Around Us

Location, fourth panel to left of entrance inside Visitor Center

The abundant food and shallow continental shelf in waters surrounding Point Reyes are calling cards for marine mammals- specifically whales. Within the offshore waters over 20 species of whales have been seen, including the blue whale, the largest animal that ever lived. Acrobatic humpback whales have been seen more frequently in recent years. The gray whale is the most commonly observed whale because it travels close to the coastline during its annual migrations. Several thousand gray whales are seen each year by visitors at the Lighthouse.

The Southern Migration: Late December through January In October ice begins to form in the Arctic Seas, sending a message to gray whales that migration must begin to the warmer water of Baja California some 6,000 miles away. Traveling 100 miles each day, most of the gray whale population passes Point Reyes some time between late December and the end of January. By early February, only a few stragglers pass by the Headlands.

The Northern Migration: Late February through May
The Northern migration occurs in two pulses. The earliest returnees are pregnant
females, adult males, and juveniles, who pass by Point Reyes mostly in March.
Leaving Mexico almost a month later, the second pulse is composed of mothers
with their newborn calves, which can be seen offshore through May.

D.

Gray Whale Facts

Location, fifth panel to left of entrance inside Visitor Center

Size: adults: 30-50 ft., 20-40 tons Life Span: Average 30-40 years

Population: 15,000-21,000 (estimate)

Color: Slate gray, heavily mottled with barnacles and white from pigmentation

Vocalization: low tones or frequencies

Speed: Average speed 4-5 mph. Normal Dive Depth: 120 ft.

Normal Duration of Dive: 3-5 minutes

Dorsal Ridge: No dorsal fin; a series of 6-12 knuckles or ridges

How Do Gray Whales Feed?

Unlike other baleen whales which feed in the open ocean, gray whales prefer to feed on bottom dwelling invertebrates in ocean sediments. The whales stir the mud on the ocean floor and draw in a mixture of prey, sediment and water. The average gray whale consumes approximately one ton of amphipods a day.



A Filtering System

Baleen whales filter food through fibrous plates that hang from the upper jaws. These plate, known as the baleen, are fringed with coarse hair which act as a sieve to capture the whale's food. As they feed on small shrimp-like crustaceans, the water is forced through the baleen and the food is strained by the hairy curtains.



Ε.

Whale Watching...

Location, sixth panel to left of entrance inside Visitor Center

The key to whale watching is patience and knowing what to look for. Scan the ocean all the way to the horizon for the telltale spout. Wear warm clothes, bring binoculars, and even a picnic lunch.

Spouting

Most visitors see spouting as whales pass the Headlands. The spout is formed by condensed moisture of the gray whale's exhalation. The plume can rise 10-15 feet in the air.

Sounding

As a gray whale begins a long dive, one may get a chance to see the powerful flukes that propel it on the migration journey. A typical sequence for diving is 3-4 spouts at intervals of 10-20 seconds followed by a deep dive of 3-4 minutes.

Spyhopping

Occasionally a gray whale can be seen raising its head out of the water 8-10 feet as if it wanted to look around. Thirty seconds or more may pass before it slips back into the water.

The Point Reyes Lighthouse, Tomales Point, and South Beach provide good vantage points to see the southern migration. The northern migrations best viewed from the Lighthouse and Chimney Rock.

Note: the information printed on the above panel has a mistake in its text. It should read in the last paragraph "...points to see the northern migration. The southern migrations best viewed..."

F.

Whale Watching

Wayside on Observation Deck behind Lighthouse Visitor Center

Winter Migration

Arctic region to Mexican calving areas whales swim south (to your left) past Point Reyes, November to February.



Spring Migration

Mexico to arctic feeding grounds whales swim north (to your right) Past point Reyes, January -April.

California gray whales pass Point Reyes on their seasonal migrations, and often you can see them from this area. The best views are from high ground near the water where you can look down as well as out to sea.

In the spring whales stay close to shore look for them just beyond the breakers, past beaches, or next to the rocky walls of the Point Reyes headlands. Whales pass in the winter also, but usually farther off shore.

Spot gray whales by their spouts- air exhaled through their blowholes that rises 10-15 feet and condenses into white vapor.

Gray whales travel singly or in "pods" of three or more. Their swimming pattern consists of a series of short dives with spouting followed by a deeper dive lasting several minutes. By counting spouts you can plot their progress.

Gray whales swim at a good walking pace, 4-5 mph.

Breaching

Sometimes the gray whale will hurl half its thirty to fifty foot length out of the water and land smack on its back.

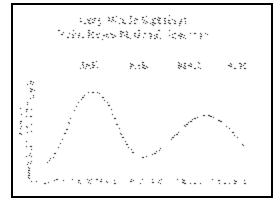
Spyhopping

Gray whales are occasionally seen with their heads above water, standing on their tails. Why? Perhaps to look around periscope style or to aid in swallowing food.

Diving

At the beginning of a steep dive, the huge tail flukes rise momentarily before disappearing into the deep.

G. Gray Whale Migration Chart for Point Reyes Located on wall behind "Please Touch" counter inside Visitor Center



Н.

Gray Whale Baleen

Text located on wall behind "Please Touch" display, baleen located at "Please Touch" display; both inside Visitor Center

Baleen is found in the upper jaws of 11 species of large whales instead of teeth and is made of material similar to your hair and fingernails. These whales use their baleen to filter small food items from the sea. Commercially, baleen was once one of the most valuable parts of the whale. Flexible and strong, it was used for corset stays and umbrella ribs.

Large black baleen: adult humpback whale, composed of three plates

Large yellow baleen: gray whale, 5 feet on each side, 130 total plates on each side

Small black baleen: blue whale

Small yellow baleen: baby gray whale

Ι.

Photo Album

Located on shelf to left of lightship lens inside Visitor Center

This adult gray whale washed ashore in the urban area of Alameda (near San Francisco) on August 7, 1999. She had died out at sea, probably of old age. Park rangers believe she was about 45 years old. She was towed back out to sea, near Point Reyes National Seashore.

After a day floating at sea, the whale's skin is sunburned and in poor condition. This shark researcher watched as a 15-20 foot great white took a bite out of the carcass.

These are bite marks left from the attack.

The shark almost took a huge bite from the whale's nose. The part you see underwater is the whale's lower jaw.

The researcher's boat is 20 feet long. How big do you think the whale is? If the whale's body washes ashore again, the bones may be recovered and the whale skeleton reconstructed by a local 6th grade class.

J.

Barnacles, Krill, Whale Lice

Located at "Please Touch" counter inside Visitor Center

Three jars containing whale lice, barnacles and krill.



How Can I Capture My Experiences in a Story, Poem or Drawing?



On-site

Lesson Plan

Students will use their experience whale watching to create a story, poem, or drawing. Drafts or sketches may be made in their field journals and final writings or drawings completed in class. Students or teachers are able to choose which activities will be completed.

Time required: ½ hour

Location: on-site/classroom/ homework

Suggested group size: entire class

Subject(s): creative writing; science, language arts

Concepts covered: poetry; creative writing

Written by: Melinda Repko, National Park Service

Last updated: 12/08/00

Student Outcomes

At the end of this activity, students will be able to:

- Reflect on their experiences by sharing a poem, story, or drawing.
- Make emotional connections to the resources.

Materials:

To be supplied by teacher:

• Extra paper to be included into field journal

To be photocopied from this guide:

 How Can I Capture My Experiences in a Story, Poem or Drawing? Field Journal Sheet

Procedures

- 1. Include a copy of the **How Can I Capture My Experience in a Story, Poem, or Drawing?** activity sheet in each student's journal.
- 2. Either choose an activity for students to complete or have students decide which they would like to complete.
- 3. Allow at least one-half hour to complete this activity in the field. Students may refine their work once back in class.







Extension ideas

- 1. Have students complete a variety of the activities, creating a booklet of their creative work.
- 2. Using canvas material and tempera paint, have students create a mural of their experiences at the Point Reyes Lighthouse Observation Deck.

How Can I Capture My Experiences in a Story, Poem, or Drawing?



Choose one of the following activities. Use blank paper in your field journal to complete your work.

1. Create a Haiku

A three-line poem originating in Japan based on syllables- not rhyming.

Line 1: five syllables Line 2: seven syllables Line 3: five syllables

2. Create a Diamante

This five-line poem is displayed in the shape of a diamond.

Line 1: noun
Line 2: adjective adjective
Line 3: participle participle participle participle
Line 4: noun noun noun
Line 5: noun

3. Freestyle Poem

A poem can rhyme or not rhyme. It can be many words or few. The only limitation is your imagination!

4. Create an Outline-Creation

Draw the outline of a gray whale in pencil. Use the outline as a guide to write your words on. OR use the outline as a guide to write your words in. Use words or sentences that describe its characteristics. Hint: if you draw in pencil and write in pen, you can carefully erase the pencil when the ink dries.

5. Create a Comic Strip

Think about the different events that took place while you were visiting the Observation Deck. Create a comic strip depicting one of these events. Don't forget to give your comic strip a title.

6. Create a Story

Answer the question: "What would be missing from your life if gray whales had gone extinct and you never had the chance to see them?"

7. Create an Essay

What would be missing from your life if gray whales had gone extinct and you never had the chance to see them?

